[57] **ABSTRACT**

An interactive system for a local intervention inside a region of a non-homogeneous structure, such as the skull of a patient, which is related to the frame of reference (R_2) of an operation table, and which is connected to a reference structure comprising a plurality of base points. The system creates on a screen a representation of the non-homogeneous structure and of the reference structure connected thereto, provides the coordinates of the images of the base points in the first frame of reference (R_1), allows the marking of the coordinates of the base points in R_2, and allows the carrying out of the local intervention with an active member such as a trephining tool, a needle, or a radioactive or chemical implant. The systems also optimizes the transfer of reference frames between R_1 and R_2, from the coordinates of the base points in R_2 and the images in R_1 by reducing down to a minimum the deviations between the coordinates of images in R_1 and the base points in R_1 after transfer. The system also establishes real time bi-directional coupling between: (1) an origin and a direction of intervention simulated on the screen, (2) the position of the active member.

16 Claims, 13 Drawing Sheets